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Attorney Docket No. ANO6129P1US
Serial No. 10/007,861**REMARKS**

No amendments have been made from the prior listing of claims. Accordingly, claims 1, 26-35, 43-53, 61-63 and 73-91 are currently pending for consideration.

I. Office Action Summary:

Applicants note that the Office Action Summary only indicates that claims 1 and 26-65 are pending and that claims 1, 26-35, 43-53 and 61-63 have been rejected. However, the Detailed Action also indicates that claims 73-91 stand rejected.

II. Rejections:

In the Office Action, claims 1, 26-35, 43-53, 61-63 and 73-91 were rejected under 35 U.S.C. 103(a) as being unpatentable over Johansson et al. (U.S. Patent No. 5,368,833) (hereinafter "Johansson et al."), in view of Anderson et al. (U.S. Patent No. 5,603,805) (hereinafter "Anderson et al."). This rejection is respectfully traversed.

The present invention provides a process for the production of an aqueous sol containing silica-based particles. The process involves the sequential steps of acidifying, a first alkalizing step, a particle growth step and a second alkalizing step, under specific conditions which are critical to provide a sol having improved drainage and retention performance. The process makes it possible to produce silica-based sols with high stability, high specific surface area, low S-values and high solids contents as well as excellent drainage and retention characteristics. Silica-based sols with these characteristics are in demand in the papermaking industry.

The Office Action rejects claims 1, 26-35, 43-53, 61-63 and 73-91 by attempting to combine the Johansson et al. and Anderson et al. references. The Applicants respectfully submit that it is inappropriate to combine the references as suggested by the Office Action.

Johansson et al. disclose silica sols and a process for their production. The process of Johansson involves: acidification of an aqueous alkali water glass solution to a pH of from about 1 to about 4 (col. 2, lines 56-58); and alkalization of the acid sol to a pH of at the lowest equal to 8 and suitably to a pH within the range of from 8 to 11 (col. 3, lines 19-21). After the alkalization a particle growth is carried out and thereby a decrease of the specific surface area, and the desired specific surface area is subsequently stabilized by modification with aluminum (col. 3, lines 45-50).

It is evident that Johansson et al. do not disclose, suggest or teach two alkalization steps as claimed in the present application. This is acknowledged in the Office Action on page 4, where it states that Johansson "differs from the claims in employing two alkalization steps to achieve the resulting silica sols." The Office Action, however, attempts to fill in the deficiency in the teaching of Johansson et al. with the teachings of Anderson et al. Specifically, the Office Action contends on page 5 that "it would have been obvious to one of ordinary skill in the art to vary the pH to values of greater than 7, e.g., 7.5 to 8.5, taught in Anderson et al. for the advantage of obtaining a desired degree of microgel formation and specific surface area for a time period and temperature suitable therefore, and to work within the pH ranges by additional alkalization of the silica sol within the pH ranges taught in the Johansson et al reference." Applicants respectfully disagree.

Andersson et al. disclose silica sols and a process for their production. The process of Andersson et al. involves acidification of an alkali water glass solution to a pH of from about 1 to about 4 (col. 3, lines 2-4); and alkalization of the acid sol to a pH of at the lowest equal to 7 and suitably to a pH within the

range of from 7.5 to 9 (col. 3, lines 19-32). After the alkalization a particle growth starts and thereby a decrease of the specific surface area (col. 3, lines 58-61). The desired decrease in surface area to the range 300 to 700 m²/g can be obtained by heat-treatment (col. 3, lines 61-62).

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations. See MPEP §2142.

The teaching or suggestion to make the claimed combination (or modification) and the reasonable expectation of success must both be found in the prior art, and not based on the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, the reference must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 U.S.P.Q. 972, 973 (Bd. Pat. App. & Inter. 1985).

From a close reading of the Andersson et al. reference, it is evident that it does not disclose, suggest or teach two alkalization steps as claimed in the present application. It is further evident that Andersson et al. are silent about alkalization to a pH of at least 10.0, as claimed in the present application.

A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. In re Kotzab, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000) (citing In re Dembiczak, 50 USPQ2d 1614 (Fed. Cir. 1999)). Federal Circuit case law makes clear that the best defense against the subtle but powerful attraction to hindsight-based obvious analysis is rigorous application of the requirement for a showing of a teaching or motivation to combine prior art references. In re Lee, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002). There must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. *Id.*

It is respectfully submitted that nowhere does Johansson et al. or Anderson et al., when read alone or together, teach or suggest two alkalization steps, as presently claimed. There is no teaching in Andersson et al. that would alleviate the deficiencies of the primary reference Johansson et al.. Applicants submit that the only motivation for performing the two sequential alkalization steps, in accordance with the present claims, comes from the present application and not the cited prior art; and absent impermissible hindsight reliance on the present application, one of ordinary skill in the art would not be able arrive at the present claims from a reading of the cited references.

Applicants further submit that Johansson et al. teaches away from the presently claimed invention by teaching that "after the alkalization a growth process is thus carried out so that the desired specific surface area is obtained and this is subsequently stabilized by modification with aluminum." See Col. 3, lines 47-50 (emphasis added). Similarly, Anderson teaches away from the presently claimed invention by teaching that "after the alkalization a growth process is thus carried out so that the desired specific surface area is obtained." See Col. 3, lines 57-61 (emphasis added). Applicants submit that these teachings would teach away from a subsequent second alkalization following the growth process.

Finally, applicants submit that the process steps, including the two sequential alkalization steps, according to the invention are critical to obtain sols having enhanced drainage and retention performance. The criticality of the process steps of the claimed invention is shown in the examples of the present application. Example 1 illustrates the production of standard silica sols that are used for comparison and which did not include a distinct second alkalization to a pH of at least 10.0, as required by the claimed invention. The standard silica sols used for comparison (Sol 1a, Sol 1b, and Sol 1c) showed lower specific surface areas and/or silica contents at corresponding S-values and also lower drainage and retention characteristics.

One of these standard silica sols, produced by a prior art process and referred to as Sol 1c (ref.), showed an S-value of 32% and a specific surface area of 690 m²/g SiO₂, i.e. S-value and specific surface area within the ranges as taught by Andersson et al.

Examples 2-5 of the present application illustrate the invention. All of the silica-based sols in these examples were produced by a process which included a second alkalization to a pH of at least 10.0, as required by the claimed invention, and they all showed a combination of high stability, high specific surface area, low S-values and high solids contents. One of the silica-based sols produced according to the process as claimed in the present application is referred to as Sol 2d, which had an S-value of 31% and a specific surface area of 680 m²/g SiO₂, i.e. S-value and specific surface area very close to those of Sol 1c (ref.), the standard silica sol mentioned above.

Example 6 shows the drainage performance of these two sols. As is evident from table 2, the use of the standard silica sol Sol 1c (ref.) resulted in a dewatering time of 12.0 sec., whereas the use of Sol 2d, which was produced by the process as claimed in the present application, resulted in a dewatering time of 9.7 sec., thus a considerable improvement.

Example 6 further show the drainage performance of a sol produced by the process as claimed in the present application, Sol 3; and a commercial silica sol produced by a prior art process which did not include a second alkalization to a pH of at least 10.0, as required by the claimed invention, Sol 6b (ref.). It can be seen from the data of Example 6 that the standard silica sol Sol 6b had an S-value of 36% and specific surface area of 880 m²/g SiO₂, i.e. S-value and specific surface area within the ranges as taught by Johansson et al '833. It can also be seen from the data of Example 3 that Sol 3 had an S-value of 34% and specific surface area of 760 m²/g SiO₂, i.e. S-value and specific surface area very close to those of Sol 6b (ref.), the standard silica sol mentioned above.

Table 2 shows that the standard silica sol Sol 6b resulted in a dewatering time of 9.8 sec., whereas the use of Sol 3 resulted in a dewatering time of 9.5 sec., which is a further improvement of the dewatering time despite the fact that the specific surface area of Sol 3 was much lower than that of Sol 6a (ref.). The remaining examples also show that the silica based sols which were produced by the process as claimed in the present application resulted in both favorable properties and excellent drainage and retention characteristics.

In summary, there is no disclosure or teaching in Johansson et al. that would motivate one of ordinary skill in the art to practice the claimed method that includes first and second alkalization steps, with an intermediate particle growth or heat-treating step, as claimed. Moreover, there is also no disclosure or teaching in Anderson et al. that would alleviate the substantial deficiencies of the Johansson et al. primary reference. Absent impermissible hindsight reliance on the present application, there would be no motivation for one of ordinary skill in the art to arrive at the claimed invention. Further, the cited references actually teach away from the claimed invention. Finally, the process according to the claimed invention provides unexpected results, e.g., sols with improved drainage and retention characteristics.

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Therefore, for the reasons set forth above, it is respectfully requested that the rejections of claims 1, 26-35, 43-53, 61-63 and 73-91 under 35 U.S.C. 103(a) as being unpatentable over Johansson et al., in view of Anderson et al. be withdrawn.

II. **Conclusion:**

Accordingly, Applicants respectfully submit that the application, including claims 1, 26-35, 43-53, 61-63 and 73-91, as amended, is in proper form for allowance, which action is earnestly solicited. If resolution of any remaining issue is required prior to allowance of the application, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,



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